

# Pilot Trials of the STAR TGC Protocol in a Cardiac Surgery ICU

Aaron Le Compte<sup>1</sup>, PhD; Sophie Penning<sup>2</sup>, MSc; Katherine T. Moorhead<sup>2</sup>, PhD;  
Paul Massion<sup>3</sup>, MD; Jean-Charles Preiser<sup>3</sup>, PhD; Geoffrey M. Shaw<sup>4</sup>, MbChB;  
Thomas Desai<sup>2</sup>, PhD; J. Geoffrey Chase<sup>1</sup>, PhD;

1: University of Canterbury, Centre for BioEngineering, Christchurch, New Zealand  
*Email: [aaron.lecompte@canterbury.ac.nz](mailto:aaron.lecompte@canterbury.ac.nz)*

2: University of Liege, Cardiovascular Research Centre, Liege Belgium

3: Centre Hospitalier Universitaire de Liege, University of Liege, Liege, Belgium

4: Dept of Intensive Care, Christchurch Hospital, Christchurch, New Zealand

## Objective:

Tight glycemic control (TGC) has shown benefits in cardiac surgery ICU patients. STAR is a model-based TGC protocol accounting for patient variability with a stochastically derived maximum 5% risk of blood glucose (BG) below 72mg/dL. This abstract describes the first clinical pilot trials of STAR.

## Method:

The glycemic target was 125mg/dL. Each trial was 24 hours with BG measured 1-2 hourly. Two-hourly measurement was used when BG was between 110-135mg/dL for 3 hours. Each intervention leads to a predicted BG level and outcome range (5-95<sup>th</sup> percentile). Carbohydrate intake (all sources) was monitored, but not changed from clinical settings except to prevent BG < 100mg/dL. Insulin infusion rates were limited (6U/hour maximum), with limited increases based on current infusion rate (0.5-2.0U/hour). Approval was granted by the Ethics Committee of the Medical Faculty of the University of Liege (Liege, Belgium).

## Results:

Two patients were recruited immediately post-operative, and two were in the ICU 3-5 days prior. Median per-patient results were: BG: 116-146mg/dL; Carbohydrate Administered: 2-11g/hour; Insulin: 0.2-2.0U/hour. Median prediction errors ranged: 9.8-17.7% (12-24mg/dL), with larger errors due to small meals and other clinical events. The minimum BG was 63mg/dL.

## Conclusion:

STAR effectively controlled all patients to target. Observed patient variability in response to insulin and thus prediction errors were higher than expected, likely due to the recent insult of cardiac surgery and their immediate recovery. STAR effectively managed this variability with no hypoglycemia, and the high density BG data allows comparison of variability between surgical and medical ICU patients.